BERMUDA

5 AUG 1952

REPORT

OF THE

DEPARTMENT

OF

AGRICULTURE

FOR THE YEAR

1951

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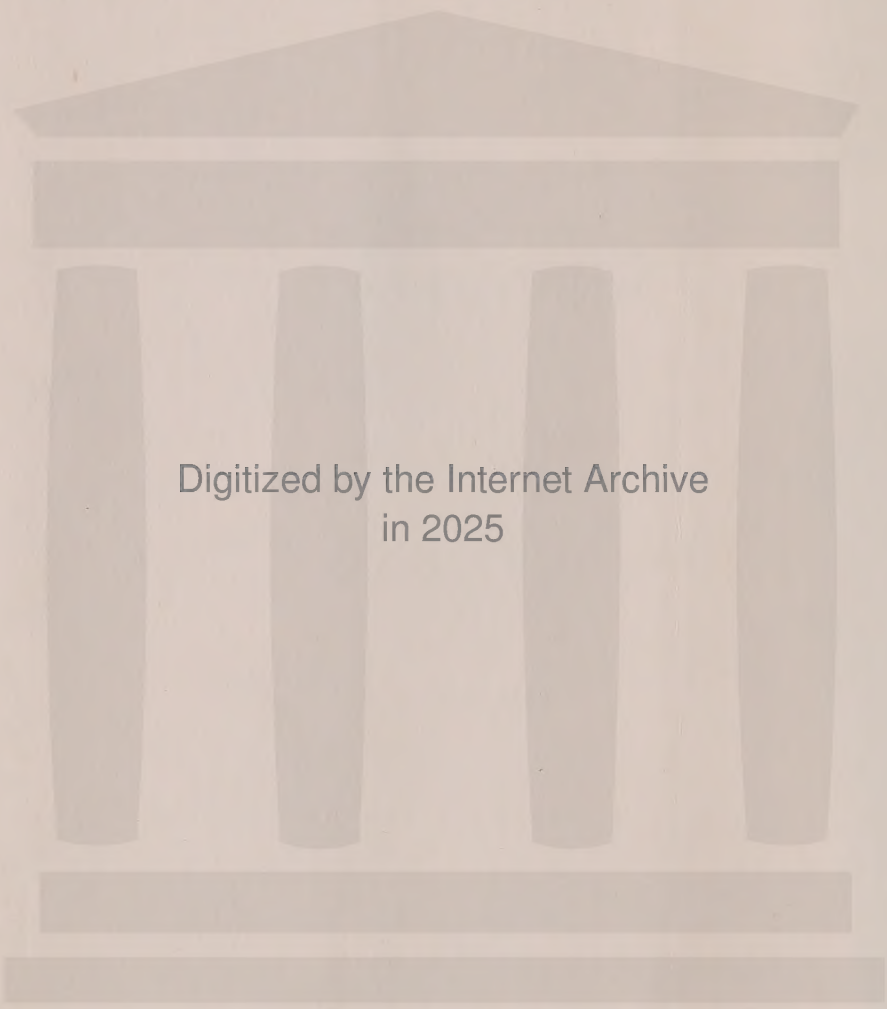

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BOARD OF AGRICULTURE, 1951.

Messrs. H. St. George Butterfield, M.C.P., Chairman.

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H. T. North, M.C.P.

DEPARTMENT OF AGRICULTURE, 1951.

Civil Service List

Director of Agriculture	W. R. Evans
Assistant Director of Agriculture	G. R. Groves
Agricultural Assistant	C. V. S. Early
Inspector of Produce	T. A. Hollis
Horticulturist	C. A. Baker
Assistant Horticulturist	G. D. Paley (to 30th November, 1951)
Clerk, Board of Agriculture	Mrs. Helen W. Morrison (Acting)
Plant Pathologist	Vacant
Government Veterinary Officer	Edward R. Earl, V.S., B.V.Sc.

Not on Civil Service List

Marketing Officer	J. H. Hollis
Assistant Marketing Officer	Carlyle Hollis
Accountant	Miss Amy DeSilva (Acting)

REPORT OF DIRECTOR OF AGRICULTURE
FOR THE YEAR 1951.

The Chairman,
The Board of Agriculture.

I have the honour to submit the reports of the principal officers of the Department of Agriculture for the year 1951 in accordance with the usual practice.

GENERAL AGRICULTURAL CONDITIONS.

The reports of the principal officers deal in detail with the many activities which come within the jurisdiction of the Department of Agriculture. In the agricultural field considerable progress has been registered in respect of "Planned Production & Marketing" and the horticultural aspect of the Department's activities has assumed prominence and definite progress has been made in many directions.

AGRICULTURAL STATION

The work of improving the aesthetic beauty of the grounds of the Agricultural Station was continued and several innovations were completed during the year.

REFORESTATION

This phase of the Department's activities has encroached greatly on the time and energy of the principal officers of the Department. As indicated in the report of the Assistant Director, 22,490 plants were distributed from the Nurseries of the Department during the year. These plants were all established in containers and over 60 tons of soil or compost was used in their make up. This, I think was a remarkable achievement considering the limited area and the facilities available for plant propagation work at the Agricultural Station.

The removal of dead cedar trees under the direction of Mr. T. A. Hollis and Mr. Jack King was effectively performed. Since the commencement of operations three years ago over one hundred thousand trees have been removed.

BIOLOGICAL CONTROL OF INSECT PESTS

This work was performed under the direction of the Commonwealth Institute of Biological Control and through the good offices of Dr. W. R. Thompson, Director of the Institute, Mr. Fred D. Bennett's services were made available to the Department throughout the year. The work performed by Mr. Bennett is fully recorded in his report.

Contrary to the general belief the Department of Agriculture is still deeply interested in biological control. Some of the less susceptible of the Junipers are still holding up against the depredations of Carulaspis visci and there is reason to believe that the predators and parasites introduced here are exerting their influence on the trees struggling for existence. It is conservatively estimated that 85% of the Island's cedars are dead; the living 15% are in various stages of defoliation resulting from scale injury and considering that they have survived the optimum virulence of the scale attack it is reasonable to assume some of them have acquired tolerance to the infestation and with the assistance of enemies of the scale will survive to reproduce their species.

PRODUCTION OF GROUND CROPS AND ANIMAL PRODUCTS AND LIVESTOCK POPULATION.

A.

Commodity	Area under crop exp. in acres.	Average yield per acres in lbs.	Total yield in lbs.	Unit Value	Farm Value
Beans	40	4,000	160,000	1/4	10,166
Beets	25	8,000	200,000	5d.	4,166
Broccoli	20	2,500	50,000	1/6	3,750
Cabbage	40	12,000	480,000	6d.	12,000
Carrots	55	11,000	605,000	6d.	15,100
Onions	25	10,000	250,000	8d.	8,250
Potatoes Irish	263	9,000	2,367,000	5d.	49,310
Potatoes Sweet	51	8,000	408,000	6d.	10,200
Tomatoes	50	8,000	400,000	1/-	20,000
Misc.	45	8,000	360,000	6d.	9,000
Bananas	133½	20,000	2,720,000	8d.	90,664
	747½		8,000,000		£ 232,606

B. CITRUS

Area under cultivation in acres	No. of Trees	Average yield per tree in dozens.	Yield in dozens Total.	Unit Value	Farm Value
75	10,500	4	42,000	5/-	£ 10,500

C. LILY BULBS AND FLOWERS

Area under cultivation in acres	No. of bulbs planted.	No. of bulbs exported.	Value	No. of flower buds exported.	Value
29	1,500,000	136,600	£ 4,518	1,900,000	£ 20,657

No. of flower stems exported.	Value	Total value of all lily products
40,000	£ 10,000	£ 35,175

D. MILK

Total production expressed in gallons.	Value
630,000	£ 157,500

E. MEAT PRODUCTS

Beef in lbs.	Value.	Veal in lbs.	Value.	Pork in lbs.	Value.	Poultry in lbs.	Value.
55,000	£ 3,437	63,000	£ 3,150	350,000	£26,250	55,000	£ 5,500

F. EGGS

Expressed in dozens	Value
350,000	£ 105,000

LIVESTOCK POPULATION

A. DAIRY ANIMALS

Cows	Heifers	Bulls	Total
1,000	136	55	1,191

B. HORSES

Farm & Truck	Carriage	Race Horses	Total
100	70	60	230

C. PIGS

Sows	Boars	Store Pigs	Piglets	Total
240	50	1,500	450	2,240

ACKNOWLEDGEMENT

I wish to record my grateful thanks to individuals and institutions who have contributed publications to the Department Library and assisted in other ways. The assistance afforded by the Commonwealth Institute of Biological Control under the direction of Dr. W. R. Thompson is gratefully acknowledged. The Colony owes a debt of gratitude to Mr. Dolph Schaefer who has during the year contributed liberally of his talent and energy by assisting the Department with many of the landscaping projects undertaken in connection with the reforestation programme.

It is my pleasure to record the loyal work of all members of my staff who during the year have cheerfully performed their duties with efficiency and devotion.

Respectfully submitted,

W. R. EVANS
DIRECTOR OF AGRICULTURE.

26th March, 1952.

REPORT OF THE ASSISTANT DIRECTOR OF AGRICULTURE
FOR THE YEAR 1951.

The Director of Agriculture.

I have the honour to submit a report of my work for the year 1951.

AGRICULTURAL STATION

GENERAL: The weather during the year was not so favourable to plant growth as the previous two years. Gales and high winds were responsible for spoiling many of the newly planted trees and shrubs. The year opened with a severe gale during the early hours of 1st January; high winds persisted until April. In September winds of gale force from a hurricane in the vicinity of Bermuda played their part in defoliating various plants, but the most damaging gale of the year was that which swept the Islands on the night of the 30th November. This storm destroyed practically all the flowering growths of the autumn and winter flowering plants including the Poinsettias. On this occasion the large specimen of Cocoloba uvifera, south of Montrose House, was uprooted. Fortunately, the tree was successfully replanted. It is estimated that this specimen is in the region of fifty years old.

Despite the inclement weather the Agricultural Station was maintained in good condition. Further improvements were undertaken, both in additional plantings and in the erection of new buildings. The building programme included the completion of the Exhibition Stables, the re-building of two glasshouses with cedar and the making of cedar furniture for the Board Room and Director's Office.

CITRUS ORCHARDS: A reasonably heavy crop of fruit was obtained from both the Victory and Old Orchards. The size of the grapefruit, especially such varieties as Marsh Seedless and Glen Red was much smaller than usual. While no detailed records have been made of the yields per tree, it is interesting to record the yields from two grapefruit trees. Both trees were planted in 1944 and the size of the fruit was similar; an average weight of 12 ozs. per fruit. One tree of Royal yielded 61 dozen fruit and one Duncan tree produced 31 dozen fruit. The largest sized grapefruits were obtained from the varieties McCarty and Connors. Thompson Pink produced a heavy crop of medium to large fruits. Of the oranges the Navel trees bore a medium crop of large oranges, while Parson Brown, Pineapple and Hamlin bore heavy crops. Lemons and limes both produced average yields.

The spraying programme of the Victory Orchard included two applications of oil emulsion, one application of sulphur and one application of the nutritional spray. The latter being a dual purpose spray took the place of one sulphur spray for the control of rust mite. This Orchard was remarkably free from rust mite and scale insects. The Old Orchard was sprayed three times with oil emulsion only. Here again the fruits were remarkably clean, with little evidence of rust mite.

Certain trees in the Victory Orchard were given, in addition to the normal fertiliser application, an extra 12 lbs. of balanced fertiliser per tree during August to determine whether this increased feeding has any effect on future crops.

PLANT COLLECTIONS: The various collections of plants were well cared for and several valuable additions were made during the year. Orchids continue to be an attraction to visitors. Under the guidance of the Horticulturist the cultivation of Orchids has continued at the previous high level. The usual display of spring flowering annuals dominated

the beds in front of the Main Office building. To follow the spring annuals Vinca rosea was planted for summer and autumn flowering. This plant proved to be far less trouble than the Zinnia and bloomed continuously until the end of November, when the beds were cleared in readiness for the planting of the spring annuals for 1952.

AGRICULTURAL EXHIBITION: For the Agricultural Exhibition held at the Station on the 18th; 19th and 20th April, the grounds were in excellent shape. This Exhibition attracted a large number of people who were also able to see the improvements made at the Agricultural Station during the last three years. Although large crowds of people attended the Exhibition very little damage was done to the newly planted trees and shrubs. All the plants in the immediate vicinity of the Main Exhibition features were protected by sturdy plant guards.

RAINFALL: The following monthly rainfall was recorded at the Agricultural Station for 1951:

January	7.88 inches
February	2.93 "
March	2.72 "
April	2.87 "
May	5.31 "
June	1.39 "
July	5.65 "
August	5.35 "
September	1.22 "
October	9.34 "
November	4.28 "
December	4.08 "
	52.52 "

FIVE YEAR MANURIAL AND COSTINGS EXPERIMENT

Full details of the second cropping season of the five year manurial and costings experiment were submitted in July. Extracts from that report are included here to give some idea of the progress of the experiment. It is interesting to record that the yield of the Potato crop was considerably larger than the previous year. This was due to the extra rainfall. The rainfall for the period July 1950 to June 1951 was 55.66 inches which is regarded as an average annual rainfall. Whereas the rainfall for the previous cropping season was only 38.26 inches. The other crops showed much variation. Yields of Carrots were higher than the 1949-50 season, but the Ruta Baga was smaller. Cabbage on the other hand with the exception of the plot treated with farmyard manure gave approximately the same yield.

The highest yields of Potatoes and Ruta Baga were obtained from the plot treated with 4-12-6, while castor pomace gave the highest yield of Cabbage and Carrot. It was observed that the Carrots from the Eastern plot commenced to rot immediately after lifting, due to Sclerotinia. This is a factor which requires further investigation, since it is possible that castor pomace may be beneficial to the growth of Sclerotinia.

In analysing the costings side of the experiment, it is revealed that with farmyard manure valued at £5. per ton and the reduced yields from this plot the profit for the season amounted to 9/3 per rod compared with £1.10. 0. for the Western plot and £1. 6. 0. for the Eastern plot. Table I shows the rate of fertilizer applied and the yield per rod for the 1950-51 season and Table II is a comparison of yields for the two seasons.

TABLE I.

PLOT	RATE OF FERTILIZER APPLIED	Yields per rod. POTATOES TRIUMPH	CABBAGE	CARROT	RUTA BAGA
WEST	12 cwts. per acre. 4-12-6	67 lbs.	141 lbs.	168 lbs.	104 lbs.
CENTRE	16 tons F.Y.M. per acre.	53⅜ "	93 "	135 "	75 "
EAST	12 cwts. per acre, Castor Pomace	50½ "	156 "	229 "	63 "

TABLE II.

COMPARISON OF YIELDS PER ROD.

	WEST PLOT		CENTRE PLOT		EAST PLOT	
CROP	1949-50	1950-51	1949-50	1950-51	1949-50	1950-51
POTATOES	23 lbs.	67 lbs.	17 lbs.	53⅜ lbs.	18 lbs.	50½ lbs.
CABBAGE	141 "	141 "	150 "	93 "	129 "	156 "
CARROTS	127½ "	168 "	111 "	135 "	79½ "	229 "
RUTA BAGA	137 "	104 "	98 "	75 "	133½ "	63 "

BANANA EXPERIMENT: In the Banana Experiment reported in the Annual Report for 1950 the plants made very good growth during the year under review. The plants which were planted in August 1950 commenced to bloom in August 1951 and some large bunches weighing up to 40 lbs. each were produced. In the other sections planted in December 1950 and March 1951 the plants grew rapidly throughout the summer. The December plantings commenced to bloom in November 1951. Unfortunately, the severe gale of the 30th November played havoc with the whole plantation and some 20 plants were completely destroyed and others had to be replanted.

Fertilizer was applied in accordance with the programme in June and December. The plantation is divided into twenty, three row blocks.

The following manures are being used: Seaweed, Pig Manure, Cow Manure, 4-12-6, Castor Pomace, Seaweed plus 4-12-6, Seaweed plus Castor Pomace, Pig Manure plus 4-12-6, and Pig Manure plus Castor Pomace. One three row block to be used as a control is not receiving any fertiliser at all. Careful observations are being made of the behavior of the plants but it is too early to give further details at this stage.

SWEET POTATOES: A trial of Sweet Potatoes is in progress, using the variety "Porto Rico No. 2". At the time of reporting it is not possible to do more than mention the trial.

TOMATO VARIETIES: Seven varieties of Tomatoes raised by the Department of Agriculture, Hawaii, were tested. All the varieties grew well and produced heavy crops. Seed was saved of each kind and a further trial has been arranged for 1952.

PLANT PROPAGATION

LOCAL NURSERIES: Everything possible was done to increase the propagation of plants locally. Efforts were concentrated on the production of those items in greatest demand, but even so, difficulties were experienced due to insufficient trained personnel on the Staff. The Assistant Horticulturist who was in charge of this work resigned in November.

It is obvious that the employment of a first class plant propagation officer is absolutely essential, if the nurseries are to supply the plants required for the vast amount of planting which has to be done in the future. In plant propagation, attention to the smallest detail is vastly important, and unless constant and personal supervision by an experienced worker is given the work, the production of the plants falls rapidly. Likewise, the poor condition of the plants reflects badly on the general organization of the nursery.

OVERSEAS NURSERIES: The nurseries in Jamaica and Trinidad continued to operate successfully. These nurseries are under the supervision of the Departments of Agriculture in the respective Colonies and are maintained by funds provided by the Bermuda Government.

From the 1st January to 31st December 1951, the following ornamental plants were received from these nurseries:

JAMAICA	17,267
TRINIDAD	13,624
Total:	30,891

In addition to the plants imported from the West Indies some 1,347 trees and shrubs were imported from Florida. The total number of ornamental plants imported from all sources was 32,238.

CITRUS NURSERY: Unfortunately, due to the shortage of trained personnel the propagation of the citrus trees locally could not be proceeded with. The rough lemon stocks grew remarkably well. It is hoped that these stocks may be successfully budded in the spring of 1952.

SALE & DISTRIBUTION OF ORNAMENTAL PLANTS: Including the trees, shrubs, climbers and palms used in the various planting schemes, undertaken by the Department of Agriculture, plants donated to the Arbor Societies and other public bodies and those sold to private individuals the total number of plants sent out from the nurseries during 1951 amounted to 22,490. This figure represents an increase of 760 plants over the 1950 figure.

SALE OF FRUIT TREES: During the year 3,709 citrus trees were imported and sold to the general public at prices below cost. Some 700 Avocado pear trees were also imported and sold.

PLANTING & LANDSCAPING

A planting unit under the Reafforestation Scheme was fully employed throughout 1951. Amongst the planting projects undertaken are included the planting of 300 trees at the Prospect Camp and 760 trees on the north side of Government House property. In addition to this work numerous smaller projects were successfully executed. Many requests from private sources could not be undertaken due to insufficient supervision for this particular type of work.

ARBOR SOCIETIES: The Arbor Societies were not so active as in previous years and no special projects were undertaken.

HAMILTON CORPORATION: A detailed plan for planting the streets of Hamilton was submitted to the Corporation. This plan was approved in principle and it is anticipated that the actual planting operations will be conducted during 1952.

CEDAR PLANTATION: It was reported in last year's Annual Report that a plantation of Juniperus bermudiana had been planted on Government land adjoining the Public Works Department Quarry, Harrington Sound. These seedling trees although having made a reasonable amount of growth are at the time of reporting heavily infested with the Juniperus scale Carulaspis visci.

Seed of Juniperus bermudiana was sent to the Fiji Islands, to Barbados and to South Africa, where it is hoped that this Juniper will become established.

PLANT INTRODUCTIONS.

In view of the suitability of the Juniper to Bermuda, a collection of six species of Juniperus was imported from Florida for trial purposes. Other introductions included Pyracantha coccinea lalandi, P. formosana, Photinia serulata, Magnolia fuscata, Ligustrum nobile, Ilex crenata rotundifolia, Retinospera pisifera and Albizzia julibrissin.

SUPERVISION OF OTHER GOVERNMENT PROPERTIES.

Other Government properties under the supervision of the Department of Agriculture include Government House Gardens, Bernard Park, The House of Assembly Grounds, the Colonial Secretariat Grounds and the Small Park at Crow Lane, Paget; all of which were maintained in good condition.

In the case of Barnard Park vandalism continues unabated. During the course of the year many plants were destroyed and plant guards broken, in some cases beyond repair. This type of wilful destruction has been reported on many occasions, with little hope of finding a practical solution to the problem.

INSPECTION OF EASTER LILIES.

The first inspection of the lily fields took place between 17th and 28th January and the second was carried out between 15th and 30th March. Out of a total of 61 fields inspected 58 passed the final inspection giving an area of 30.75 acres. The three fields condemned were due to the incidence of disease and improper rogueing.

SURVEY OF BERMUDA FARMS.

A survey of the Bermuda farms was conducted by the Assistant Marketing Officer and the writer of this report, during November. Work of this type had been contemplated for some months, but due to pressure of work in other directions time could not be spared for such an undertaking at an earlier date. It was realized that a feeling existed amongst some of the farmers that the Department of Agriculture was devoting considerable time and energy to Citrus Culture and general reafforestation work at the expense of Agriculture proper. The survey was therefore a means to dispel the feeling of neglect and to point out the advantages to the farming community of the "Planned Production & Marketing Scheme" which has already been in operation for two years with a considerable amount of success. The opportunity was taken to discuss current farming problems on the farms and some long discussions were held during a tour of the growing crops. Each visit was recorded with notes of the total area under cultivation and details of specific cropping. These figures are quoted elsewhere in the Report of the Department. A detailed report of the findings was submitted at the conclusion of the survey. This tour of the farms was invaluable since it afforded the writer the opportunity to visit many of the farms not previously visited and to become familiar with the type of farming practiced.

DUTY LEAVE

From the 1st to 22nd September I was on duty leave in the United States with the Acting Plant Pathologist. A tour was made of the Southeastern United States for the purpose of studying and collecting natural enemies of the Juniper scale, Carulaspis visci. In addition to this work the opportunity was taken to visit Agricultural Experimental Stations and Plant Nurseries to gather information which might prove useful in our work in Bermuda. The area visited included the Hudson Valley, Maryland, District of Columbia, Virginia, North and South Carolina, Georgia and Florida.

OTHER ACTIVITIES

ADVISORY VISITS: Throughout the year I made 180 advisory visits. The nature of the enquiries covered questions on Citrus Culture, Landscape Gardening and general Horticulture.

LECTURES: Talks were given to three of the Arbor Societies and to the Bermuda Garden Club on general Horticulture.

BROADCASTS: Of the 12 monthly broadcasts by the Department of Agriculture during the year I was responsible for the production of five.

PUBLICATIONS: Bulletin No. 26 on "Trees, Shrubs, Palms & Succulent Plants" was revised and reprinted. The first edition being out of print 12 months after its original publication.

Respectfully submitted,

GORDON R. GROVES
ASST. DIRECTOR OF AGRICULTURE.

6th February, 1952.

REPORT OF THE ACTING PLANT PATHOLOGIST FOR THE YEAR 1951.

The Director of Agriculture.

I have the honour to submit a report on work done on Plant Diseases and Pests during the year 1951.

GENERAL REVIEW

The continuation of the biological control programme against the Juniper scale Carulaspis visci Schrank, an introduced pest of the Bermuda Cedar Tree Juniperus bermudiana L. occupied most of the time of the author. Stress during the past year has been placed on the introduction of new species of predators in conjunction with the continuation of a modified programme of mass rearing in the Bermuda laboratory.

Introductions of numerous species of scale feeding Coccinelids from Trinidad were made through the co-operation of the Commonwealth Institute of Biological Control. In addition, a personal search for new predators was made in Jamaica, with the co-operation of Dr. F. J. Simmonds, Entomologist, Commonwealth Institute of Biological Control, Trinidad sub-station. In the company of the Assistant Director of Agriculture, a three weeks survey of the South eastern area of the United States was carried out to collect further enemies of the juniper scale. Several new species of Coccinelids were introduced to Bermuda as a result of these two trips. Reports on these trips have been submitted.

BIOLOGICAL CONTROL OF INSECT PESTS

A. CARULASPIS VISCI ON CEDARS.

1. Carulaspis visci and the condition of the Cedar Trees:

During the early months of the year, deterioration of the cedar trees as a result of scale infestation was barely noticeable. This was just the opposite to the first two months of 1950, when very rapid deterioration of the trees occurred. This contrast is due largely to more favourable weather conditions as the rainfall during this period in 1951 was normal, whereas a severe drought was experienced in 1950.

As in past years a new flush of growth appeared on the trees during March and April and remained relatively free from scale until late in July. During August and September extremely heavy infestations were noted in some areas, followed by a rapid decline of the affected trees. Several weak trees throughout the Islands died during July and August as a result of the combined effects of the Carulaspis scale and hot weather. By December it became apparent that areas of trees in the Western Parishes of Bermuda were declining considerably and it is doubtful whether many large stands of trees will carry enough foliage to be of ornamental use by the end of 1952.

In the Central and Eastern Parishes all larger stands of trees are either partially or completely dead with the exception of the trees on Paget Island, St. George's Parish. On this Island the trees are in extremely good condition and have showed practically no deterioration over the past two years.

2. Lindorus lophanthae, Blaisd.

The Coccinelid predator Lindorus lophanthae was introduced with several other predators in 1947. Until recently it was the only predator that showed any promise of giving any degree of control against the cedar scale Carulaspis visci.

Lindorus was well established in most areas of the Island by December 1948 and at that time had checked the scale sufficiently to slow up the rate of defoliation. Surveys conducted in December of 1948, 1949, 1950 show that the predator has reached it's peak and is not sufficient enough to give complete control of the scale. In the surveys conducted in December 1949 four trees in each of twenty-six stands of trees situated along the main roads were selected, making a total of 104 selected trees. Four trees in the same stands of trees were examined in 1950 and again in 1951. The following comparisons were made:

	1949.	1950.	1951.
Total sites	26	26	26
Total branches beaten	104	104	104
Total Lindorus adults	81	96	73
Total Lindorus larvae	442	193	185
Sites where Lindorus was absent	9	14	16

Lindorus has become less prevalent since the first survey was conducted. This is partly due to the sparseness of the foliage on the trees in the Central and Eastern ends of the Island as the numbers of larvae and adults in the Western Parishes remained much the same.

The increased number of sites where Lindorus was absent can also be partially due to the thinness of the foliage. Although sufficient scale to support a limited number of predators was present in practically all areas Lindorus seems to disappear if the foliage is too thin. This may be the result of increased exposure to the wind, birds, ants and chameleons.

In general, it appears that Lindorus, while capable of giving limited control of Carulaspis visci is not sufficiently efficient to give complete control.

3. Microweisia suturalis Schwartz.

Another Coccinelid, Microweisia suturalis, introduced by the Commonwealth Institute of Biological Control from California where it feeds on Carulaspis visci is becoming more numerous. This tiny dark reddish-brown beetle was first liberated in June 1949 and liberations were made almost every month until May 1950. Over one hundred thousand adults were liberated. A few limited recoveries of this species were made until June 1950. Up to this time it appeared that Microweisia was dying out in a manner similar to several other introduced species. Since June recoveries from several sites have been made and it is apparent that this species is now well established. It has increased in many areas in the Western Parishes to the point where it is more numerous than Lindorus. In recent months recoveries have been made in Sandys, Southampton, Warwick and Paget Parishes. Practically all liberations were confined to these Parishes so the spread of Microweisia to other Parishes will be quite slow as this species cannot be mass-reared in the Bermuda laboratory. It will probably require a lapse of two or three years more before the full value of Microweisia is known. As it is a much smaller Coccinelid than Lindorus it should be able to maintain itself on less food and therefore breed in lighter infestations of scale. Furthermore, it's small size render it less susceptable to attack by birds and chameleons.

4. Recovery of Other Predators:

(A) Telsimia: Mass-rearing of Telsimia was discontinued during 1951. This Coccinelid breeds freely in the field for one or two generations and then dies out. This has been the case with the exception of one location. Recoveries of Telsimia have been made on one tree on Paget Island, St. George's Parish on several occasions although no liberations of this species have been made since June 1950. The scale infestation on this tree is very light and the tree shows no sign of scale injury. However, the Coccinelid has not become established on trees in the immediate vicinity and therefore appears to be of little use as a general controlling factor of the cedar scale.

(B) Other Species of Beetles: The occasional adult or larva of Cybocephalus sp. (origin China) and Lotis nigerrima is discovered feeding on the scale. However, despite numerous liberations no widespread recoveries have been made.

(C) Hemisarcoptes malus: This predacious mite is still present in some locations in Warwick and Southampton but it has not become numerous enough to exert any degree of control.

5. Introduction and Testing of new Predators for Carulaspis visci:

(A) Trinidad: Twenty-five shipments of miscellaneous scale feeding Coccinelids were received from Dr. F. J. Simmonds, Entomologist, Commonwealth Institute of Biological Control, West Indian Sub-Station, Trinidad, during 1951. All shipments were made from field collected material and included over 6,500 individuals of seventeen species of Coccinelids. The species sent were: Azya trinitatis, Azya orbigera, Curinus caeruleus, Lioscymnus diversipes, Pentilia insidiosa, Cryptognatha nodiceps, Pentilia confluens, Chnoodes sp., Scymnus spp., Cryptognatha tumidiventris, Exochomus revista, Zenoria revistita, Prodilis sp., Pentilia castanea, Exochomus bisbinotatus, and at least three unidentified species.

Adults of all species were liberated on cedar trees infested with Carulaspis visci, but no recoveries of any species have been made. Several hundred adults of Cryptognatha nodiceps were reared in the Bermuda Laboratory on Oleander Scale but as extensive tests of this species on the Carulaspis scale were not promising, rearing of this species was discontinued.

(B) Jamaica: Several collections of Coccinelids were made by Dr. F. J. Simmonds and the author during a survey of Jamaica in May, 1951. The survey was conducted to determine whether or not the species of Juniperus growing in Jamaica were infested with Carulaspis visci and if so to collect any natural enemies that occurred. As the scale was not present in Jamaica, Coccinelids were absent from the Juniperus spp. However, several species of Coccinelids were collected on other scales, mainly Asterolecanium bambusae.

The species shipped to Bermuda were: Chilocorus cacti, Exochomus jamacensis, Exochomus ritchei, Procula douei, Cycloneda sanguinea (an aphid feeder) and Scymnus sp. (mealybug predator). A total of 2,800 adults were sent. All species were tested on juniper scale and were also placed on the Oleander Scale for mass rearing. Only one species, Chilocorus cacti showed any promise. Larvae were produced and reared to the adult stage on Carulaspis visci and on the Oleander Scale. Several thousand adults of this species have been reared and liberated. Although no promising recoveries of this species have been made from cedar trees, it appears to be well established on the bamboo scale Asterolcanium bambusae as a result of liberations made since June 1951.

(C) South-eastern States: As a result of a collecting trip in the Southeastern area of the United States in company with the Assistant Director of Agriculture, six species of Coccinelids were introduced into Bermuda for trial on Carulaspis visci. The species collected were Chilocorus stigma (bivulnerus) Coccinella novemnotata, Cleis picta, Microweisia miscella, Cyclonida sanguinea (an aphid feeder) and an unidentified species. Two of these species showed promise when tested on the juniper scale. Chilocorus stigma and Microweisia miscella both completed their life cycle on juniper scale in the Laboratory. Chilocorus stigma is being reared in the Bermuda laboratory at present. Unfortunately, Microweisia miscella will not reproduce on the Oleander scale and therefore cannot be mass reared. No recoveries of either species have been made from the point where initial liberations were made.

Predators from California: The mass-rearing of predators for Bermuda which has been carried on under the direction of the Commonwealth Institute of Biological Control for the past three years was terminated.

In closing out production 8,766 adults of seven species were sent to Bermuda. The species sent are Lotis nigerrima, Lotis neglecta, Zagloba ornata, Pharoscymnus exiguus, Cephaloscymnus occidentalis, Lindorus lophanthae, Pentilia insidiosa and Cybocephalus (Chinese) sp. All species are Coccinelids with the exception of Cybocephalus which is a Nitidulid. The numbers of each species sent appear in Table I.

Predators reared in Bermuda: Emphasis during the past year has been placed on the introduction and testing of new predators. Unfortunately, most of these species could not be successfully mass-reared on the Oleander Scale Pseudalacaspis pentagona and consequently the number of mass-reared predators is considerably less than in 1950. A total of 276,682 adults of ten species of predacious beetles was reared. These were distributed as follows:

Liberated on cedar trees	193,535
Sent to Trinidad	33,773
Liberated on misc. scales	11,069
Retained for mass-rearing	38,305
Total:	276,682

The numbers of each species are given in Table II.

6. Shipment of Beetles to Trinidad:

During the period from June 30th to October 19th, 1951, several shipments of scale feeding Coccinelids were shipped to Dr. F. J. Simmonds, Commonwealth Institute of Biological Control, Trinidad Sub-Station, for trial on various scales throughout the West Indies. The numbers of each species sent are as follows:

Lotis neglecta	11,037
Lindorus lophanthae	9,425
Lotis nigerrima	4,402
Telsimia sp.	7,325
Chilocorus bipustulatus	1,584
Total:	33,773

B. CRYPTOCHAETUM ICERYA WILL. A DIPTEROUS PARASITE OF ICERYA PURCHASI MASK.

1. Introduction of Cryptochaetum:

Shipments of this parasite were again sent to Bermuda this year from California by Mr. W. F. Sellers, Commonwealth Institute of Biological Control during February and March, 1951. From the five shipments of parasitized scales fifteen thousand parasites were liberated. Liberations were made in every parish in Bermuda on infestations of Cottony Cushion Scale, on Casuarinas, Citrus and Pittosporum.

2. Recovery of Cryptochaetum from Points of Liberation:

Promising recoveries of Cryptochaetum were made. In July parasitized scales were collected in eight locations representing five of the nine parishes of Bermuda. Recoveries were made at two points where no parasites had been liberated, the nearest point of liberation being a quarter of a mile away.

Sufficient liberations of Cryptochaetum have been made to give this parasite a fair trial.

Recoveries have been promising and the next two years should determine whether or not this parasite will aid in controlling the Cottony Cushion Scale.

C. POTATO TUBER MOTH INVESTIGATION.

Recovery attempts were made in order to determine whether parasites of the Potato Tuber Moth introduced in 1946-1948 had become established.

In 1948 Mr. Bedford made several collections of potatoes from fields where the parasites had been liberated in 1946 and in 1948.

Of the four introduced species (See Annual Report, 1948) which were liberated, three were recovered - Copidosoma koehleri Blanchard, Bracon (Microbracon) gelechiae Ashm. and Chelonus phtherimaeae Gah. Copidosoma was recovered in large numbers, but only small numbers of the other two species were recovered.

These two species were first introduced in 1945, but none were recovered until after the liberations of 1948.

Bedford states (unpublished notes of 1948) that Copidosoma appeared to be well established prior to the liberations of 1948, as he recovered this parasite from two samples of infested tubers prior to the 1948 releases.

In addition to the introduced species, Bedford also bred the following parasites from potato samples collected in 1948.

Ichneumonidae Horogenes compressus (Cr.)
Braconidae Apanteles dignus Mues.
Bassus gibbosus Say.
Apanteles sp.

During May, June and July 1951 collections of Potato Tubers from fields were made at weekly intervals and held in the laboratory for emerging parasites. In addition, three collections of potato tops from volunteer plants were made during the latter part of July.

Only one species of the four species introduced in 1946-1948 was recovered and only small numbers of this species were observed.

This species was Bracon (Microbracon) gelechiae Ashm. A local species Horogenes compressus Cr. was quite numerous from most collections.

Several parasites were collected from the samples of potato tops. However, other species of caterpillars were also present, so their host relationship is uncertain. The species bred from potato tops are:

Cirrospiloides sp. Eulophidae	Leaf miner parasite?
Opius sp. Brachonidae	" " "
Bracon (Microbracon) gelechiae Ashm.	Tuber moth "
Apanateles dignus Mues. Braconidae	" " "
Horogenes compressus Cr. Ichneumonidae	" " "

All parasites were kindly identified by the U. S. Department of Agriculture.

In recent years the position of the Potato Tuber Moth has become less critical. This is due partly to the reduced number of potatoes held in storage, partly to the effects of parasitism and partly to improved cultural practices by the farmers; more care being exercised in keeping the tubers covered with soil during the growing season.

D. BIOLOGICAL CONTROL OF MEALYBUGS AND MISCELLANEOUS SCALES.

1. Mealybugs:

(a) General: Several species of mealybugs are troublesome from time to time in Bermuda. Although little economic damage is done to commercial crops, several species of ornamental plants are frequently so heavily attacked that defoliation and death of the plants occur. The plants which are most frequently attacked are the Croton Codiaeum variecatum and the Sago Palm; the Croton suffering from heavy attacks by the Citrus mealybug Pseudococcus citri; the Sago Palm affected by Pseudococcus adonidum.

The only species of parasite recorded as attacking the citrus mealybug in Bermuda is Leptomastix dactylopyii. No species have been recovered from Pseudococcus adonidum.

(b) Introduction of Parasites: In April 1951, shipments of various species of mealybug parasites were sent from California by Dr. D. C. Lloyd, Entomologist, Commonwealth Institute of Biological Control, in charge of mealybug investigation. Between April 21st and January 31st, 1951, forty-two shipments of parasites were received. The majority of these parasites were sent in the prepupal and early pupal stages, adults emerging a few days after arrival in Bermuda.

Emerging adults of Thelyotokous species were liberated daily. Adults of biparental species were held in vials for 24 hours, honey streaks being present for food.

An estimated total of 45,350 adults of five species were liberated. One other species Anarhopus sydneyensis Timb. was shipped in the adult stage. The seventy adults which were shipped were all dead on arrival.

Species sent.	Number.	To control.
Pauridia peregrina Timb.	19,000	Pseudococcus citri
Tetracnemus peregrinus Comp.	18,500	Pseudococcus adonidum
Pseudaphycus angelicus How.	1,600	Pseudococcus longispinus & Phenacoccus gossypii
Acerophagus pallidus Timb.	6,000	Phenacoccus gossypii
Anagyrus fusciventris Gir.	250	Pseudococcus adonidum
Total:	45,350	

(c) Recovery of Parasites: Several infestations of mealybugs were checked for the presence of the liberated species a month or more after liberation.

Pauridia peregrina was recovered from two locations about 30 days after liberation, but subsequent collections did not produce any parasites.

Tetracnemus peregrinus appears to be well established in several locations on the Sago Palm mealybug. Recoveries have been made from at least six sites at intervals ranging from a month to six months after liberation. No recoveries of the other species have been made.

2. Miscellaneous Scales:

Several liberations of scale feeding Coccinelids which were introduced for the control of the Cedar Scale, have been made on miscellaneous scales such as the Bamboo Scale Asterolecanium bambusae, the palmetto scale Comstockiella Sabalis and the Oleander Scale Pseudalacaspis pentagona. For details of the species liberated on miscellaneous scales refer to Table II.

Of the species liberated, only two have been recorded as reproducing on any of the scales. Larvae and adults of Lindorus lophanthae have been noted on several occasions on the Oleander Scale, Pseudalacaspis pentagona. Chilocorus cacti was liberated on infestations of bamboo scale Asterolecanium bambusae at "Springfield Lodge" Paget. Adults, larvae and pupae are now very numerous and this species can be recorded as established in Bermuda.

E. MEDITERRANEAN FRUIT FLY, CERATITIS CAPITATA WILD.

As a supplement to the work carried out by Dr. J. M. Waterston in 1950, several samples of fruit were held in the laboratory for emergence of parasites or fruit flies. Results concurred with those of Dr. Waterston as no parasites were bred from any fruit and numerous fruit flies appeared in the jars.

In February seventy mature maggots of the Mediterranean fruit fly were bred from three grapefruit and two oranges. Forty-eight flies were reared from these maggots. The remainder died without pupating.

In July several "stung" peaches, green grapefruit, and Kei Apples were held in the laboratory for emergence of fruit flies. Numerous fruit flies were bred from the peaches and Kei Apples but no parasites were present. No maggots appeared from the green grapefruit. Dissection of the fruit showed that the eggs of the fruit fly had failed to hatch. Apparently the eggs of the fruit fly are killed by the action of the juices of the green citrus fruit.

It is difficult to account for the reduction of the number of attacked fruits, particularly peaches in recent years as there are apparently no parasites of the fruit fly in Bermuda.

Furthermore, the scarcity of the fruit fly would make it difficult to introduce any parasites at the present time as there is not a constant supply of fruit fly larvae to carry out laboratory rearings of the parasites.

In view of the increased planting of Citrus, the incidence of the fruit fly should be studied from year to year, for although the green fruit is not a suitable host for the development of the fruit fly, ripe fruit does act as a host. If a build up of the fruit fly does occur within the next few years, the introduction of parasites would be warranted.

INSPECTION SERVICES

JAPANESE BEETLE QUARANTINE:

Regulations designed to prevent the establishment of the Japanese Beetle, Popillia japonica Meus. in Bermuda were again enforced. Examination of all ships and aeroplanes arriving in Bermuda, was carried out by members of the Bermuda Health Department, thus relieving the author from a time consuming job.

Japanese Beetle traps were set out at the airport, near Hamilton Harbour and near St. George's Harbour. The traps were inspected weekly but no Japanese Beetles were captured.

Members of the Department of Health intercepted several live adults on aeroplanes which arrived from the United States. No beetles were discovered on steam ships.

GENERAL INSPECTION:

1. Inspection of Properties:

Numerous requests for advice regarding insects and diseases were attended to. Although many of the requests were satisfactorily explained over the telephone, over fifty visits were required to investigate various complaints.

2. Inspection of Nursery Stock:

Sixty-five consignments of imported plants were examined at the Hamilton Dock or at the Post Office. Several other consignments were inspected by the Officers of the Department and by officials from the Department of Health.

Twenty consignments of "diseased" plants and bulbs were confiscated and destroyed. In addition, ten consignments of sweet corn, bananas, sweet potatoes and plants in soil, imported contrary to the Bermuda Bye-Laws were confiscated and destroyed.

Ten shipments of plants for export were examined and certificates were issued.

INSECTS, MITES AND PLANT DISEASES RECORDED.

Arranged according to Hosts - " Denotes a new record.

Acalypha Wilksiana.

A heavy infestation of Phenacoccus gossypii (Towns. & Ckll) was observed on an Acalypha hedge in Warwick. One month later all of the mealybugs had transferred to a Hibiscus hedge.

Brassica oleracea L. Cabbage, Cauliflower and Mustard.

Murgantia histrionica Hahn. Although the Harlequin bug was quite numerous less damage was inflicted than in 1951.

Casuarina equisetifolia L. Whistling Pine.

A soft scale Coccus elongatus Sign. was reported as causing some damage to young Casuarinas.

Citrus spp.

Several soft scales were collected from citrus trees and sent to the U. S. D. A. for specific determination. Three distinct species, commonly grouped in Bermuda as "Soft Brown Scale" were identified.

All three belong to the Coccidae, Pulvinaria psidii, Mask. Coccus viridis Green. and Coccus hesperidum L. are the three species

present. Pulvinaria psidii is the most prevalent and causes the most damage. Discoloration of fruit due to the feeding injury of the rust mite Eriophyes oleivorus Ashm. was very severe this year.

Several adults of the Mediterranean Fruit Fly Ceratitis capitata were bred from oranges and grapefruit in February 1951. Attack by fruit fly is often experienced when the fruit is immature but the eggs seldom hatch.

Ficus nitida Indian Laurel.

Severe curling of the foliage was noted at the Department of Agriculture as a result of feeding by thrips Gnaikothrips ficorum Marcha. This insect was also noted on Ligustrum.

Juniperus bermudiana. Bermuda Cedar.

The spruce mite Paratetranychus ununguis Jac. caused yellowing to foliage of young cedars in January and February.

The Oyster Shell Scale Lepidosaphes newsteadi Sulc. at one time considered as serious a menace as Carulaspis visci has almost disappeared. Light infestations of this scale were observed on two occasions only, during 1951.

Nerium oleander L. Oleander.

A few outbreaks of the Oleander Scale Pseudalacaspis pentagona were severe enough to warrant spraying.

Heavy infestations of Pulvinaria psidii were seen on several occasions. These attacks were accompanied by the presence of sooty mold which gave the shrubs a very unsightly appearance.

Persea gratissima. Avocado Pear.

" A heavy infestation of the avocado mite Paratetanychus yothersi Mc.G. was encountered in April.

Solanum tuberosum L. Potato

Collections of potato tubers were made during the summer months. (See details of recovery in the report). The nymphs and adults of the predacious pentatomid, " Podisus maculiventris were captured while feeding on the larvae of the potato tuber moth Anorimoschaema operculella Zell.

Sterculia sp.

Adults of the Chalcid parasite " Trichogramma sp. were bred from lepidopterous eggs which were oviposited on the leaves of Sterculia sp.

Miscellaneous Insects and Mites.

Adults of the Corixid " Sigara sp. collected in large numbers by Mr. E. C. G. Bedford in 1950 on Warwick Pond and Harrington Sound (Det. Com. Inst. Ent.)

One adult of the Reduviid " Empicoris sp. n. was collected on a cedar tree (Det. Com. Inst. Ent.)

Numerous adults of the Ichneumonid " Barichneumon rubicundus Cresson were taken in flight during April (Det. Com. Inst. Ent.)

Miscellaneous mites collected on Juniper at "Southlands" Paget, included three species of the family Oribatudae namely Scaphesopulchellus sp. Berlese Oripoda sp. (elongata) Banks and Pergarde and Phanloppia sp. (Det. Com. Inst. Ent.)

Two species of Tabanids, Tabanus atlanticus Johns. which is quite rare and Tabanus nigrovittatus MacG. were collected on the beach. (Det. Com. Inst. Ent.)

Four large beetles belonging to the family Passalidae; " Passalus internuptus (L) were intercepted in a shipment of plants from Trinidad. (Det. Com. Inst. Ent.)

A Hymenopterous parasite from the oothecae of a tree infesting Cockroach (probably " Aglaopterys diaphara F. was identified as Anastatus sp. (probably new). (Det. U.S.D.A.)

Adults of the Ichneumonid " Enicospilus purgatus Say. were taken in flight in February.

LEAVE OF ABSENCE

The writer was absent from the Colony for three weeks in May to assist in a search for scale predators in Jamaica.

Three weeks regulation leave was taken from August 10th to September 1st. followed by a survey of the Southeastern States in the company of the Assistant Director. During this period of three weeks a search for scale predators was made. In addition, several plant nurseries and experimental stations were visited.

ACKNOWLEDGEMENTS:

Acknowledgement is made to the Commonwealth Institute of Entomology and to the United States Department of Agriculture Division of Insect Identification for the identification of insects.

STAFF:

Mrs. Stanley Mitchell joined the staff as Laboratory Assistant on January 15th, 1951.

Respectfully submitted,

FRED D. BENNETT
ACTING PLANT PATHOLOGIST.

16th January, 1952.

TABLE I.

Summary of Predators liberated against Carulaspis visci 1951.

	L. neg.	L. nig.	Pharo.	Cephalus.	Lindorus.	Zagloba.	Pent.	Cybo 1.	Cybo 2.	Tels.	C.bip.	C.cacti.	Crypto.
Predators received from California.	3,314	631	985	1,568	568	1,428	9	263	-	-	-	-	-
Predators from Bermuda laboratory.	169,987	6,796	-	-	10,347	440	-	-	1,088	1,748	33	2,639	457
TOTALS:	173,301	7,427	985	1,568	10,915	1,868	9	263	1,088	1,748	33	2,639	457

Total predators from California - 8,766
" " " Bermuda - 193,535
202,301

TABLE II

Summary of Predators reared in the Bermuda Laboratory 1951.

Species.	Cybo. 2.	L. nig.	L. neg.	Lind.	Tels.	C. bipus.	C. Cacti.	Crypto.	Zag.	C. Stig.	Totals.
Retained for rearing	1,842	1,283	29,780	100	1,900	672	2,240	257	200	31	38,305
Lib. on juniper scale.	1,088	6,796	169,987	10,347	1,748	33	2,639	457	440	-	193,535
Lib. on misc. scale.	-	500	5,832	800	1,146	103	2,688	-	-	-	11,069
Sent to Trinidad	-	4,402	11,037	9,425	7,325	1,584	-	-	-	-	33,773
TOTALS:	2,930	12,981	216,636	20,672	12,119	2,392	7,567	714	640	31	276,682

Key to Abbreviations:

Cybo. 1. Cybocephalus sp. (origin China).
Cybo. 2. Cybocephalus rufifrons.
Cephalo. Cephaloscymnus occidentalis.
Pent. Pentilia insidiosa.
Tels. Telsimia.
C.bis. Chilocorus bipustulatus.
C.stigma. Chilocorus stigma.
Lindorus. Lindorus lophanthae
Pharo. Pharoscymnus exiguus.
Zag. Zagloba ornata.
C.cacti Chilocorus cacti.
Crypto. Cryptognatha nodiceps.
L. nge. Lotis neglecta.
L. nig. Lotis nigerrima.

ANNUAL REPORT OF THE GOVERNMENT VETERINARY OFFICER FOR THE YEAR 1951.

The Director of Agriculture.

I have the honour to submit my Report for the year 1951.

TUBERCULOSIS CONTROL

The Board of Agriculture's policy to control Tuberculosis in cattle is by the bi-annual testing of all cattle in these Islands. The slaughter under inspection of those animals which react, the payment of compensation to the owners of condemned animals, and the quarantine of premises where reactors are found until three clear tests of 60 to 90 days intervals have been passed.

During 1951, 1,191 tuberculin tests were carried out on Dairy cattle in these Islands and were made up as follows:

Dairy cows:	635	Private cows:	501
" bulls:	31	" bulls:	24
	666		525

Grand total: 1,191.

Five reactors were found during the year. All in one herd which is the remnants of a very severely infected herd of 1945 and there must be a non-reacting cow in the herd which will have to be culled out soon to overcome this trouble. Everywhere else in the Islands T. B. seems to be non existant.

The Intra-dermal tuberculin test is the standard test used in these Islands and when reactors are found the ophthalmic test is used in connection with it as a check test.

BRUCELLOSIS (BANG'S DISEASE) CONTROL

The policy followed in this instance is that of calfhood vaccination, that is, all calves that are to be raised are vaccinated with strain 19 Brucella abortus vaccine between the ages of four to eight months and are bled between sixty to ninety days after vaccination to determine whether or not the vaccination has been successful. If not successful, the calf is re-vaccinated and bled in a further sixty to ninety days.

In addition, any private owner of a cow may, on request, when the animal is being tested for tuberculosis, have its blood tested in order to determine whether or not it is positive and might possibly transmit Undulant Fever in its milk.

During 1951, 120 calves were vaccinated, a slight increase over 1950 and I expect about two thirds of this group will reach maturity.

Only four persons requested that their privately owned cows be blood tested at the same time as they were being tested for tuberculosis.

It now becomes my duty to bring to your attention the fact that abortion is again on the rapid increase in these Islands and that more stringent methods will have to be taken to overcome this disease.

Prior to 1945, that is, during the war years, no cattle were imported into these Islands and a policy of calfhood vaccination was carried out, so that an almost universal resistance to this disease was to be found among the cattle here. When it became necessary to increase our cattle population in 1945, it was found impossible to obtain sufficient vaccinated stock to fill the bill and unvaccinated but Bang's negative cattle were allowed in. As a result of this virgin field being exposed to it, the quiescent Br. abortus took on a new lease of life and started to increase in virulence, until now it is even causing vaccinated stock to abort.

Calfhood vaccination should and must be continued, but a plan of adult vaccination will have to be adopted in order to stop these abortions and to try and stop the spread of infection. How best this can be accomplished will have to be worked out in conjunction with the private practitioners.

HOG CHOLERA CONTROL.

This control consists of the annual inoculation of all hogs in the Islands with anti-hog cholera serum during the Spring months and other inoculations with the same material when an outbreak occurs or is suspected of occurring.

During 1951, eleven hundred and ninety-two (1,192) hogs were given serum.

Here again I must draw to your attention the fact that a variant hog cholera virus made its appearance in the United States this year, with tremendous losses, as the universally used serum and vaccine was ineffective against it. It was not long before this variant virus found its way into our Islands and despite the extensive use of serum, which for seven years has controlled cholera here, there was no let up and the death record was considerable. A careful watch is being made on the developments in the United States to control this variant virus and I hope soon to be able to obtain a new vaccine which may prove of value here.

MEAT INSPECTION.

This phase of my activity comes under the direction of the Department of Public Health. The information gathered during the routine inspection of all carcasses coming into the abbatoirs for slaughter gives a very excellent idea of the efficacy of the various tests and control methods.

The various classes of livestock slaughtered and the amount month by month is listed below:

MEAT EXAMINED.

Month.	Cows.	Bulls.	Calves.	Hogs.	Goats.	Steers.
January	10	1	31	102	1	-
February	14	-	30	105	-	-
March	18	1	24	102	-	-
April	32	-	27	87	-	1
May	19	-	24	88	1	-
June	9	-	15	51	-	-
July	6	-	10	31	-	-
August	7	2	30	69	-	-
September	11	-	28	64	-	-
October	8	-	23	56	-	-
November	12	2	25	78	-	-
December	14	2	28	271	-	-
TOTALS:	160	8	295	1,104	2	1

MEAT CONDEMNED

CATTLE: Plucks - 2 due to T.B., 1 due to fibrosis.
Livers - 2 fibrosis; 1 telegiectasis.

CALVES: 1 carcass due to generalized arthritis.

HOGS: Heads - 4 due to abscesses; 2 due to T.B.
Plucks - 10 due to inflamatory changes.
2 due to fibrosis.
Carcasses - 1 due to cholera.
1 due to jaundice.
1 due to generalized infection.

The T. B. Plucks were from two of the five reactors.

ANIMALS ADMITTED

Only animals carrying adequate certificates of health from a proper authority in their country of origin are admitted. In the case of Steamships, I, personally meet all those carrying animals, while in the case of Aeroplanes, the Inspector of the Department of Public Health collect the certificates if they are in order and if not the animals are detained until I can be contacted.

Horses	by sea	22					
Swine	" "	63					
Dogs	" "	57	by air	104	Total	161	
Cats	" "	2	" "	24	"	26	
Rabbits	" "	3	" "	37	"	40	
Ducks	" air	6					
Chickens	" sea	3	" "	19 boxes			
Baby chicks	" air	782 cartons					
Bantams	" "	4 boxes and 7 birds.					
Turkey Poults	" "	7 cartons					
Parrots	" "	6					
Hamsters	" "	8					
Assorted Pet Birds		104					

On July 16th, 1951, I took over the work of Milk Inspector for the Department of Public Health. Prior to this, I spent three weeks in Canada attending a refresher in Milk work, both in the field and at the Ontario Veterinary College, Guelph, Ontario.

To aid me in this work the Department of Public Health have appointed Mr. Percy Fisher to be Dairy Farm Inspector.

The bacteriological work in connection with Milk Inspection is being done by the laboratory of the King Edward VII Memorial Hospital.

There has been a very great improvement in the production end of the milk industry, due in large measure to the work and persistence of Mr. Fisher and also the introduction of milk coolers on most farms.

During the latter part of the summer there were considerable complaints about sour milk from one of the pasteurization plants. On investigation it was found to be due to the fact that a large portion of the milk arriving in the morning was left standing in the cans for hours and some of it was milk that had been in a cooler the previous night. This has been overcome by the installation of a storage vat and a cooler.

There is no co-operation at all between the pasteurizers, which tends to upset the balance of supply instead of to get it to as near a constant level as is possible, which would be of great asset to the dairy industry as a whole.

IMPROVEMENT OF LIVESTOCK

One of the Government owned bulls became sterile during the year and was taken out of service to see if he would improve. It is expected to try him shortly; if he does not prove fertile, then the only thing is to let him go for beef.

A considerable number of Yorkshire swine, 63 to be exact, were brought into these Islands during the year by enterprising farmers and should do much to improve the hog industry here.

CERTIFICATES ISSUED

Twelve certificates were issued during the year covering the following:

Feed not fit for animal consumption.
Meat not fit for human consumption.
Meat fit for human consumption.
Animals for export.

OTHER DISEASES

Other diseases, such as Mastitis, continue to plague the animals in Bermuda. New methods of treatment are having some effect but prevention through care and sanitation is most necessary and yet most lacking, generally speaking, in dairy herds especially. It had been hoped to have gone into Mastitis to a considerable extent this summer past, but two or three factors, e.g. poor help in way of a student and no laboratory facilities, together with my trip for additional study, made this impossible.

GOVERNMENT HOUSE HORSES

Fifteen visits were made to the Government House stables for various reasons, such as, to give tetanus antitoxin, arrange for shoeing and general examination.

It has now been decided to do away with the present team which have proved consistently unsuitable.

POLICE CALLS

Six police calls were answered during 1951 and ranged from a complaint about a mule standing in the rain, to a case of starving a horse to death. All such calls require a report which takes time and occasionally a trip to the magistrate's court.

S. P. C. A.

On four occasions the S. P. C. A. Inspector requested me to examine animals where there was some doubt in his mind.

This Inspector proves very helpful during the tuberculin testing of cattle and was very obliging in helping me with transportation when my van was being reconditioned.

T. C. B.

During November and December, I attended the Examination Centre and assisted in the examination of those who presented themselves for licence as public carriage drivers. In all, ten visits to the Centre were made.

PRISON FARM.

With the rapid expansion of His Majesty's Prison Farm, my work in that direction has increased considerably and necessitated nineteen visits to treat animals in 1951.

REMARKS.

During the year, I was privileged to meet Major Wempe, the Veterinary Officer at Kindley Air Force Base. He was very interested in our problems and spent considerable time in looking over our dairy industry.

Some breeders from England and Scotland passed through or stayed in Bermuda. Those I met and took out on tours were favourably impressed with the cattle seen in the dairy farms.

On the whole the livestock owning population are most co-operative and friendly, doing all they can to aid me in my work.

Respectfully submitted,

EDWARD R. EARL
GOVERNMENT VETERINARY OFFICER.

5th February, 1952.

REPORT OF THE AGRICULTURAL STAFF
FOR THE YEAR 1951.

The Director of Agriculture.

I have the honour to submit my report for the year 1951

ASSISTANCE TO FARMERS

Cultivation of Land: During the year under review many farmers availed themselves of the mechanical equipment owned by the Department of Agriculture to assist in the preparation of the land for planting. A total of 134 acres of land were brought under cultivation by these means.

Spraying Service: The power sprayer units operated by the Department were hired out for spraying crops. This seasonal work amounted to 3,557 spraying hours divided as follows:

Ground Crops	781	hours.
Citrus Trees	2,282	"
Ornamental	494	"

CITRUS CULTURE

The inspections and servicing of citrus trees owned by the 300 members of the Bermuda Citrus Growers Association, absorbed the major portion of my time during 1951. Three inspections of the registered orchards were carried out. The first in January and February, the second in May and June and the third in October. Two written reports were forwarded to every member giving details of the condition of the trees. Instead of the usual sulphur sprays a nutritional spray was used in its place. This nutritional spray extensively used by the Florida Growers, contains the trace elements and sulphur as an insecticide and fungicide in the following proportions: 51% sulphur; 5% copper; 6% zinc sulphate; 4% manganese oxide; and 34% inert ingredients. Unfortunately, this spray material did not control rust mite nearly so effectively as the pure sulphur sprays did throughout the previous year. It is of course possible that the timing of the applications was not entirely correct. However, it is very difficult to spray all the trees at the right time, since it takes approximately six weeks to apply one apply one application to all of the registered trees. This time factor is extremely important. In addition to the nutritional sprays, oil emulsion was applied to control scale insects. It appears that by the use of the nutritional spray a build up of scale insects follow. In the light of experience gained during the year under report, a revised spraying programme has been arranged for 1952.

Generally speaking the condition of the trees were good except for the rather heavy infestation of rust mite in certain orchards. Cottony Cushion Scale is gradually decreasing. This is, no doubt, due to the introduction of Cryptochaetum icerya, a parasite on Cottony Cushion Scale.

Some 3,769 citrus trees were added to existing or new orchards during the year. A total of 49,300 gallons of spraying mixture was applied to the trees. This was made up by the use of 3,550 lbs. nutritional powder and 196 gallons of Oil Emulsion.

The total quantity of fertilizer sold to the citrus growers during 1951 amounted to 30,000 lbs. The analysis of this fertilizer was essentially the same as that applied in 1950.

The Annual Exhibition of Citrus fruits was not held in December, but was due to take place on the 10th, 11th and 12th January, 1952.

Respectfully submitted,

C. V. S. EARLY
AGRICULTURAL ASSISTANT.

7th January, 1952.

REPORT OF THE GOVERNMENT MARKETING OFFICER FOR THE YEAR 1951.

The Director of Agriculture.

I have the honour to submit my Annual Report on the management of the Government Cold Storage Plant and the Wholesale Marketing Centre during the year 1951.

It is gratifying to report that the business transacted through the Government Wholesale Marketing Centre during the year under review reached an all time record exceeding that of 1950 by £10,000. This healthy growth may be attributed to the implimentation of the scheme of "Planned Production & Marketing" which has enabled the farmers to gain a measure of insurance against loss through over production which frequently happens when there is no control over what the farmers grow and sell.

The following quantities of farm produce were marketed through the Wholesale Marketing Centre during the year:

COMMODITY.	QUANTITY EXP. IN LBS.	QUANTITY EXP. IN DOZENS.
BEANS	16,185	-
BEETS	6,724	-
BROCCOLI	5,679	-
CABBAGE	3,556	-
CANTELOUPE	3,069	-
CARROTS	101,498	-
CAULIFLOWER	8,316	-
CELERY	28,200	-
CORN	-	828
CUCUMBER	-	150
LETTUCE	-	2,423
ONIONS	39,401	-
ONIONS - bunches	-	150
PARSLEY	-	256
PEPPERS	-	180
POTATOES - Irish	814,630	-
POTATOES - Sweet	69,949	-
PUMPKIN	50,234	-
RADISH	-	102
SPINACH	1,679	-
TOMATOES	86,794	-
TURNIPS	11,260	-
WATERMELON	33,910	-
BANANA	33,910	-
GRAPEFRUIT	5,236	-
LEMONS	1,831	-
ORANGES	666	-
STRAWBERRIES (bskts)	2,268	-
EGGS	-	834

Comments on the purchase and distribution of vegetables:

TOMATOES: It is noteworthy that tomatoes were marketed during every month of the year excepting October. The peak of production was reached in June with 18,844 lbs. marketed. In July the quantity marketed was 12,462 lbs. and it became necessary during these two periods to export small surpluses to the local requirement to the British West Indies.

POTATOES: A record crop of good quality tubers was harvested in the Spring months and storage in the Government Chill Rooms was taxed to capacity long before the peak of the harvest. An overflow of approximately 3,000 bushels was placed in commercial chill rooms and a few hundred bushels were shipped to the British West Indies in order to relieve the local market of a small temporary glut.

CABBAGE: Cabbage is a commodity which does not sell readily after the flush of winter growth has passed. Fortunately, the flush of growth was not reached early in the season and this effect and a good demand for the product by His Majesty's warships of the North Atlantic squadron enabled supplies to be moved without the usual loss through deterioration.

BANANAS: It is gratifying to note that the sale of Bananas through the Marketing Centre is increasing and the recorded sale of 33,910 lbs. of the fruit is good indication of this tendency.

PLANT MAINTENANCE: The maintenance of the Plant was carried out by the Bermuda Trading Company by special agreement. One compressor unit was found to be defective during the summer and No. 2 chamber was out of action during the month of August. Two new compressors are on order and it is hoped these will arrive before further breakdowns will occur.

STAFF: Mr. Carlyle Hollis, Assistant Marketing Officer was absent on vacation leave from 6th August to 17th September inclusive and on sick leave from 25th September to 14th October inclusive. During the absence on leave of Mr. Carlyle Hollis, Miss Ann Hughes assisted in the work with marked efficiency.

APPRECIATION: I wish to express my appreciation to the farmers who have by their adherence to the principle of "Planned Production & Marketing" contributed to the welfare of the farming community which should pave the way to a better and more profitable farm economy in the years to come.

Respectfully submitted,

JAMES H. HOLLIS
GOVERNMENT MARKETING OFFICER.

10th February, 1952.

REPORT OF THE ACTING ACCOUNTANT
FOR THE YEAR 1951.

The Director of Agriculture.

I have the honour to submit the following Report for the year 1951.

The statistics etc. that are attached, have been compiled from records kept at the Department of Agriculture.

To the best of my knowledge all books have, at all times during the year, been correctly entered and all monies properly accounted for.

During the year 1951 no examination was made by the Audit Department of this Department's records.

It will be seen in Appendix "A" that the volume of business for the Department has greatly increased in 1951. The reason for this being obviously the increased activity on reafforestation work.

Appendix "B" shows the total expenditure for the year 1951. This shows an increase over 1950 but is in keeping with increased activities.

APPENDIX "A"

SUMMARY OF RECEIPTS FOR YEAR 1951.

Vote 2. (a)	Packing House		599. 6. 7.	
2. (b)	Marketing Centre		36,502. 5. 7.	
2. (c)	Service to Citrus Growers		415. 3. 5.	
2. (d)	Other Receipts.....		15,593. 2.10.	53,109.18. 5.

The following is a breakdown of the above:-

Vote 2. (a)	Sale of Crates		599. 6. 7.
2. (b)	Sale of Vegetables at Marketing Centre		36,502. 5. 7.
2. (c)	Service to Citrus Growers		415. 3. 5.
2. (d)	Hire of Equipment		928.18. 9.
	Sale of Plants		3,302. 1. 0.
	Sale of Citrus Trees		433. 2. 6.
	Sale of Fertilizer		901.10. 6.
	Reafforestation Work		8,558. 4. 4.
	Miscellaneous		1,469. 5. 9.
MEMO:	(Reimbursements -	410. 6. 8.)	
	(Citrus Tree Account -		
	(Sale of Citrus Trees -	1,327. 3. 6.)	53,109.18. 5.

APPENDIX "B"

EXPENDITURE FOR PERIOD JANUARY 1st TO DECEMBER 31st 1951.

VOTE	SERVICES	AMOUNT OF VOTE	EXPENDITURE	BALANCE LAPSING
1.	Fees to Members of Board	100. 0. 0.	50. 0. 0.	50. 0. 0.
2-9.	Salaries	6,150. 0. 0.	5,397. 7. 7.	752.12. 5.
9A.	Bonus to Civil Servants	924. 0. 0.	823. 5. 8.	100.14. 4.
10-13.	Salaries	2,758. 0. 0.	2,506. 5. 8.	251.14. 4.
13A.	Bonus to Other Employees	498. 0. 0.	400.17. 5.	97. 2. 7.
14.	Extra Clerical Assistance	552. 0. 0.	261. 4. 0.	290.16. 0.
15.	General Grant	4,400. 0. 0.	4,392.13.11.	7. 6. 1.
16.	Control of Animal Diseases and Improvement of Livestock	2,000. 0. 0.	1,490.11. 8.	509. 8. 4.
17.	Control of Plant Diseases & Pests.	600. 0. 0.	591.19. 3.	8. 0. 9.
18.	Horticulture	3,100. 0. 0.	3,091.15. 1.	8. 4.11.
19.	Government House Gardens	2,900. 0. 0.	2,793. 7. 8.	106.12. 4.
20.	Departmental Contingencies	300. 0. 0.	298. 2. 8.	1.17. 4.
21.	Packing House & Market Investigation	2,250. 0. 0.	2,249. 7. 7.	12. 5.
22.	Cold Storage Plant Operation	2,500. 0. 0.	2,485.16. 0.	14. 4. 0.
23.	Purchase, Upkeep & Operation of Agricultural Equipment	3,900. 0. 0.	3,891. 8. 7.	8.11. 5.
24.	Purchase and Storage of Agricultural Supplies	500. 0. 0.	486. 5. 0.	13.15. 0.
25.	Purchase and Storage of Potatoes & other Agricultural Produce for re-sale	35,000. 0. 0.	34,975. 0. 1.	24.19.11.
26.	Agricultural Scholarship	400. 0. 0.	369.16. 0.	30. 4. 0.
27.	Agricultural Exhibition	1,500. 0. 0.	1,496. 9. 1.	3.10.11.
28.	Biological Control of Insects of Importance to Bermuda	10,000. 0. 0.	7,701. 4. 8.	2,298.15. 4.
29.	Reafforestation and Roadside Planting	25,000. 0. 0.	24,899.14. 9.	100. 5. 3.
30.	Service to Citrus Growers	3,000. 0. 0.	2,823. 3. 3.	176.16. 9.
31.	Publications	400. 0. 0.	129. 5. 5.	270.14. 7.
32.	Agricultural and Horticultural Extension Work	500. 0. 0.	499. 8. 5.	11. 7.

AMY DESILVA
ACTING ACCOUNTANT.

5th April, 1952.